

CLAIMS

1. An elevator rope slippage detecting device for detecting presence/absence of slippage between a rope that moves together with movement of a car, and a pulley around which the rope is wound and which is rotated through movement of the rope, characterized by comprising:

a pulley sensor for generating a signal in accordance with rotation of the pulley;

a rope speed sensor for detecting a movement speed of the rope;
and

a processing device having: a first speed detecting portion for obtaining a speed of the car based on the signal from the pulley sensor; a second speed detecting portion for obtaining a speed of the car based on information on the movement speed from the rope sensor; and a determination portion for determining the presence/absence of slippage between the rope and the pulley by comparing the speed of the car obtained by the first speed detecting portion and the speed of the car obtained by the second speed detecting portion with each other.

2. An elevator rope slippage detecting device according to Claim 1, characterized in that the first speed detecting portion has; a car position calculating circuit for obtaining a position

of the car based on information on a rotational position of the pulley; and a car speed calculating circuit for pulley for obtaining a speed of the car based on information on the position of the car from the car position calculating circuit.

3. An elevator rope slippage detecting device according to Claim 1 or 2, characterized in that the pulley sensor is an encoder.

4. An elevator rope slippage detecting device according to Claim 3, characterized in that the rope sensor is a Doppler sensor for obtaining the movement speed of the rope by measuring a difference in frequency between an oscillating wave irradiated to a surface of the rope and a reflected wave of the oscillating wave reflected by the surface of the rope.

5. An elevator rope slippage detecting device according to Claim 4, characterized in that an energy wave intercepting member is provided in proximity to the rope sensor, for intercepting a reflected wave that is different from the reflected wave of the oscillating wave reflected by the surface of the rope.

6. An elevator rope slippage detecting device according to Claim 3, characterized in that:

irregularities are formed in the surface of the rope at a

constant interval in a longitudinal direction of the rope so that a gap between the rope sensor and the surface of the rope varies according to movement of the rope; and

the rope sensor is a gap sensor for measuring the movement speed of the rope by reading a variation period of the gap.

7. An elevator rope slippage detecting device according to Claim 6, characterized in that the rope sensor has an optical displacement sensor for obtaining a size of the gap by triangulation.

8. An elevator rope slippage detecting device according to Claim 6, characterized in that the rope sensor has a magnetic field generating portion for generating a magnetic field passing through the rope, and a detection portion for obtaining the variation period of the gap by measuring a variation period of an intensity of the magnetic field.

9. An elevator rope slippage detecting device according to Claim 1, characterized in that the rope sensor measures a movement speed of a portion of the rope wound around the pulley.

10. An elevator rope slippage detecting device according to Claim 1, characterized in that:

a pair of rollers are arranged vertically at a spacing from

each other, the pair of rollers being pressed against the rope to bend the rope; and

the rope sensor measures a movement speed of a portion of the rope tensioned between the pair of rollers.

11. An elevator rope slippage detecting device according to Claim 1, characterized in that:

a pair of rope pinching portions each having a stationary roller and a movable roller urged toward the stationary roller side are arranged vertically at a spacing from each other, for pinching the rope between the stationary roller and the movable roller; and

the rope sensor measures a movement speed of a portion of the rope tensioned between the pair of rope pinching portions.

12. An elevator apparatus characterized by comprising:

a car that is raised and lowered in a hoistway;

a rope that moves in accordance with movement of the car;

a pulley around which the rope is wound, the pulley being rotated through the movement of the rope;

a pulley sensor for detecting a rotational position of the pulley;

a rope sensor for detecting a movement speed of the rope;

a processing device for detecting presence/absence of slippage between the rope and the pulley by obtaining a speed of the car

based on information on the rotational position and a speed of the car based on information on the movement speed and comparing the obtained speeds of the car with each other; and

a control device for controlling operation of an elevator based on information from the processing device.